

REMARKS

This Amendment is filed in response to the Office Action dated July 26, 2005, which has a shortened statutory period set to expire October 26, 2005.

Claim Objections

Claim 3 stands objected to under 37 CFR 1.75(c) as "being of improper dependent form for failing to further limit the subject matter of a previous claim." Specifically, the Office Action notes that "the limitation 'the first line is at a 45° angle with respect to the first direction and the second direction' ... does not further limit the angle cited in claim 1 which is defined as diagonal." Applicants respectfully submit that the "45° angle" limitation of Claim 3 does represent a further limitation of the previous claims.

Claim 1 recites in part:

A print head in a printing system ... comprising ... a first plurality of ejectors mounted in the ejector base, the first plurality of ejectors being arranged in a first line, **the first line being diagonal to the first print direction and the second print direction.** (Emphasis added.)

Claim 2 then recites "The print head of Claim 1, wherein the **first print direction and the second print direction are orthogonal.**" (Emphasis added.) Finally, Claim 3 recites, "The print head of Claim 2, **wherein the first line is at a 45° angle with respect to the first print direction and the second print direction.**" (Emphasis added.) Thus, Claim 3 clearly limits the subject matter of Claims 1 and 2, from which Claim 3 depends.

Specifically, Claim 1 recites a limitation in which "the first line [is] diagonal to the first print direction and the second print direction." No additional limitation is placed on the relative positions of the first line, the first print

direction, and the second print direction. For example, the first line could form a 30° angle with the first print direction and a 20° angle with the second print direction (with the first print direction forming a 50° angle with the second print direction).

Claim 2 then adds the limitation that "the first print direction and the second print direction are orthogonal". However, Claim 2 places no restriction on the position of the first line relative to the first print direction and the second print direction, other than the previously cited "diagonal" limitation of Claim 1. Therefore, the first line could form a 30° angle with respect to the first print direction and a 60° angle with respect to the second print direction. Therefore, the additional limitation that "the first line is at a 45° angle with respect to the first print direction and the second print direction" recited in Claim 3 is definitely a further limitation of the subject matter recited by Claims 1 and 2.

For at least this reason, Claim 3 is proper under 37 CFR 1.75(c). Accordingly, Applicants respectfully request reconsideration and withdrawal of the objection to Claim 3.

Rejections Under 35 U.S.C. 112

Claim 3 stands rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. Specifically, the Office Action states that "there exists a confliction because the angle cannot be 45 degrees and diagonal at the same time." Applicants respectfully submit that this is an incorrect statement.

Claim 1 recites in part "the first line being diagonal to the first print direction and the second print direction." By

definition, "diagonal" means a slanted or sloping relationship that is neither orthogonal nor parallel (see, for example, the Cambridge Dictionary of American English (<http://dictionary.cambridge.org>) which defines "diagonal" as "(of a line) straight and sloping, so that it is neither horizontal nor vertical."). Therefore, for "first line [to be] at a 45° angle with respect to the first direction and the second direction" as recited in Claim 3, the first line **must** be "diagonal to the first print direction and the second print direction" as recited in Claim 1.

Thus, for at least this reason, no inconsistency exists between Claim 3 and Claim 1, and Claim 3 is allowable under 35 U.S.C. 112. Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection of Claim 3.

Rejections Under 35 U.S.C. 102

Claims 1-2, and 4-9 stand rejected under 35 U.S.C. 102(e) as being anticipated by Kubo. Applicants respectfully traverse these rejections in light of the following remarks.

Claim 1, as amended, recites:

A print head in a printing system, the printing system being configured to move the print head **in a first print direction and a second print direction** across a substrate **without changing a rotational orientation of the print head relative to the substrate**, the first print direction and the second print direction being nonparallel, the print head comprising:

- an ejector base; and
- a first plurality of ejectors mounted in the ejector base, **the first plurality of ejectors being arranged in a first line, the first line being diagonal to the first print direction and the second print direction.** (Emphasis added.)

Support for this clarifying amendment is found in the specification as originally filed at least at paragraphs 49-51 and in FIGS. 4b and 4c. No new matter is added. Claims

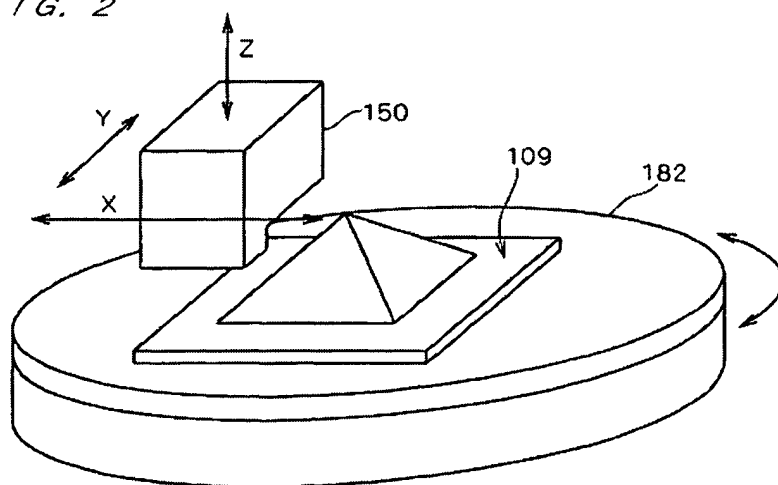
depending from Claim 1 are amended as necessary to maintain consistency with amended Claim 1. As noted in the specification as originally filed, the phrase "'print direction,' as used herein, refers to **a specific axis relative to the substrate along which printing occurs.**" (Specification, paragraph 45, emphasis added.) Thus, a "plurality of ejectors being arranged in a first line ... diagonal to the first print direction and the second print direction" as recited by Claim 1 beneficially "allows multi-line printing to be performed in both the X axis and Y axis directions without print head or substrate rotation." (Specification, paragraph 50, emphasis added.)

In contrast, Kubo teaches a system in which "the ejection head continuously moves in a single direction during a printing operation." (Kubo, col. 2, lines 4-5, emphasis added.) For example, in describing the operation of an ejection head 150 shown in FIG. 2 of Kubo (duplicated here for reference), Kubo explicitly states that:

[E]jection head 150 ejects ink from its ejection nozzles while continuously moving in the main scanning direction X, whereby a single line of printing in the main scanning direction X is performed on a target area of the printing object 109. Upon completion of one printing operation in the main scanning direction X, the

ejection head 150 is moved in the sub-scanning direction Y and starts the next printing operation in the main scanning direction X. (Kubo, col. 6, lines 38-47, emphasis added.)

FIG. 2



Nowhere does Kubo disclose or suggest printing in any other direction besides main scanning direction X. As noted by the

Office Action, Kubo teaches a system in which "[t]he second direction is a printing/scanning direction formed the same as the first direction **after the substrate is rotated at an angle.**" (Emphasis added.) Therefore, Kubo does not teach "mov[ing] the print head in a first print direction and a second print direction across a substrate without changing a rotational orientation of the print head relative to the substrate" as recited by Claim 1.

Furthermore, Kubo only describes ejection nozzles that are either perpendicular or parallel to the main scanning direction X. In FIGS. 3A and 3B of Kubo (duplicated here for reference), ejection nozzles 152 are only aligned with main

FIG. 3A

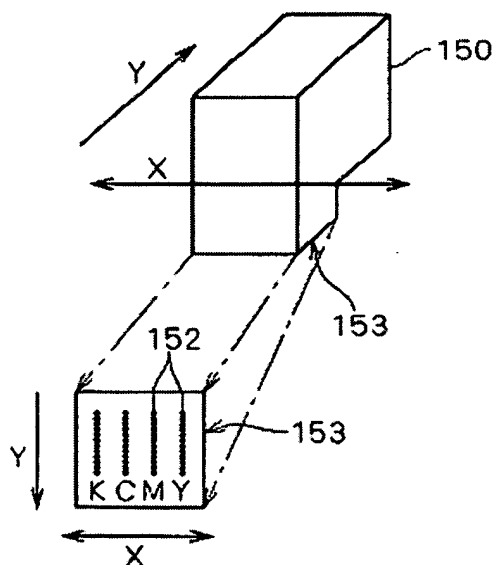
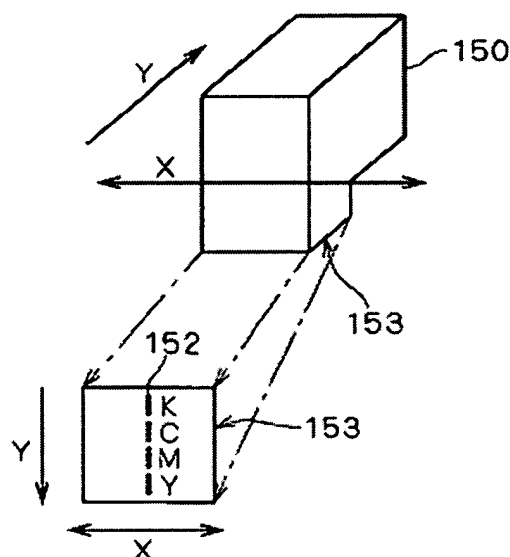


FIG. 3B



scanning direction X or sub-scanning direction Y, and therefore are explicitly not "diagonal to the first print direction and the second print direction" as recited by Claim 1.

Thus, for at least these reasons, Claim 1 is allowable under 35 U.S.C. 102(e) over Kubo. Claims 2 and 4-9 depend from Claim 1, and are therefore allowable over Kubo for at least the

same reasons that Claim 1 is allowable. Accordingly, Applicants respectfully request reconsideration and allowance of Claims 1, 2, and 4-9.

Claim 2 recites in part **"wherein the first print direction and the second print direction are orthogonal"**. (Emphasis added.) As noted above with respect to Claim 1, Kubo does not teach "mov[ing] the print head in a first print direction and a second print direction across a substrate without changing a rotational orientation of the print head relative to the substrate", and therefore cannot teach "orthogonal" first and second print directions as recited by Claim 2. For at least this reason, Claim 2 is further allowable under 35 U.S.C. 102(e) over Kubo.

Claim 4 recites in part:

[W]herein a first spacing between each of the first plurality of ejectors in the first print direction is an integer multiple of a first design rule of the IC pattern, and wherein a second spacing between each of the first plurality of ejectors in the second print direction is an integer multiple of a second design rule of the IC pattern. (Emphasis added.)

As noted in the specification as originally filed, "printing throughput can be enhanced by spacing the ejectors in the print head according to the design rules of the IC pattern being printed." (Specification, paragraph 47.) As noted above with respect to Claim 1, Kubo does not teach "mov[ing] the print head in a first print direction and a second print direction across a substrate without changing a rotational orientation of the print head relative to the substrate", and therefore cannot teach "a first spacing ... in the first print direction ... and ... a second spacing ... in the second print direction" as recited by Claim 4. For at least this additional reason, Claim 4 is further allowable under 35 U.S.C. 102(e) over Kubo.

Claim 6 recites in part:

[A] second plurality of ejectors mounted in the ejector base, the **second plurality of ejectors being arranged in a second line, the second line being parallel to the first line**, wherein each of the first plurality of ejectors and the second plurality of ejectors has a unique position in the first print direction. (Emphasis added.)

As noted above with respect to Claim 1, Kubo does not teach "mov[ing] the print head in a first print direction and a second print direction across a substrate without changing a rotational orientation of the print head relative to the substrate" as recited by Claim 1, and further does not teach "a first plurality of ejectors ... arranged in a first line ... diagonal to the first direction and the second direction" as further recited by Claim 1. Therefore, Kubo cannot teach "a second plurality of ejectors ... arranged in a second line ... parallel to the first line" as recited by Claim 6. For at least this additional reason, Claim 6 is further allowable under 35 U.S.C. 102(e) over Kubo.

Rejections Under 35 U.S.C. 103

Claim 3 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo in view of Hino. However, as noted above with respect to Claim 1, Kubo does not teach "mov[ing] the print head in a first print direction and a second print direction across a substrate without changing a rotational orientation of the print head relative to the substrate" as recited by Claim 1. Hino does not remedy this deficiency of Kubo.

Hino describes:

An information recording head ... [having] **a plurality of recording elements** arranged in two rows in parallel to each other for recording the information by the dot matrix method, and **held** by the holding member **such that each of the two rows is inclined by an inclination angle θ with respect to the scanning direction**. (Hino, abstract, emphasis added.)

Hino only teaches a single **"direction A in which the recording head 2 is moved by the carriage (i.e. the scanning direction)."** (Hino, col. 5, lines 25-27, emphasis added.) Hino is explicitly directed towards **"recording the information by the dot matrix method."** (Hino, col. 1, lines 10-11, emphasis added.) As is known in the art, dot matrix techniques rely on raster scanning (i.e., parallel scanning passes). Therefore, Hino teaches away from **"mov[ing] the print head in a first print direction and a second print direction across a substrate without changing a rotational orientation of the print head** relative to the substrate" (emphasis added) as recited by Claim 1.

Thus, for at least these reasons, Claim 3 is allowable under 35 U.S.C. 103(a) over Kubo in view of Hino. Accordingly, Applicants respectfully request reconsideration and allowance of Claim 3.

CONCLUSION

Claims 1-9 are pending in the present Application. Reconsideration and allowance of these claims is respectfully requested.

If there are any questions, please telephone the undersigned at (408) 451-5903 to expedite prosecution of this case.

Respectfully submitted,

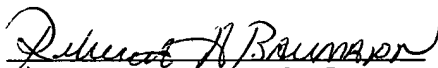


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10/26/2005
Date


Signature: Rebecca A. Baumann